PROGRESS REPORT

An Investigation of Soil Modeling Problems Related to Impact Studies

by

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January 22, 1965

TECHNICAL PROGRAMS

Static Loading Studies (Raja A. Iliya)

See the enclosed draft copy of a Ph.D. dissertation by Mr. Raja Afif Iliya entitled "Load-Settlement Study of Statically Loaded Foundation Elements" dated May, 1965.

Stress-Deformation Characteristics of Soils (Osman I. Ghazzaly)

A series of vacuum triaxial tests on dry Colorado river sand has been terminated. Analysis of results showing the effects of density, lateral pressure, level of strain, and rate of strain on the strength and deformation characteristics of this soil has also been made. A report on these tests is being written.

The investigation included three densities: 94, 102, and 108.26 lb.cu.ft. which cover the entire range of densities attainable with this sand. The lateral pressure was limited by the vacuum capabilities available in the laboratory to a maximum of about 9.0 p.s.i. The rate of strain ranged from 0.625 to 5% per minute to investigate the effect of variations in the speed of usual laboratory testing on the behavior of the sand. Static loading was used for all tests.

The soil properties investigated were the stress-strain curves of the sand, the angle of internal friction, the modulus of deformation (defined as the stress divided by strain), the lateral deformation ratio (defined as the lateral strain divided by the axial strain), and the volume changes in the sand (as determined by the measured lateral and axial deformations of the specimen).

From the point reached at the present time in this research, there are several alternative routes that can be pursued. One of these may be to continue investigating the axial stress-strain characteristics of the dry Colorado river sand as well as other soils under various conditions. Another possibility would be to investigate the effects of other types of loading; for example, repeated and dynamic loading of the test specimen. A third alternative can be to investigate the possibility of an empirical correlation between the behavior of the soil sample as determined in the laboratory and the load-settlement curves of various foundation elements in the laboratory or in the field.

Force-D formation Characteristics of Impact Loaded Foundation Elements. (Arthur R. Poor)

A series of drop tests have been performed utilizing the 8 lb test vehicles. These tests were accomplished in the laboratory under controlled conditions. Drops were made into the same sand bed as utilized for the largest models of the static test series. These tests were performed to accomplish the following:

A. Provide a complete check-out of the test procedure and instrumentation before moving to the field.

B. Provide a check on the 1604 computer program and plot routines to be utilized throughout the test series.

C. Provide a solution in certain grey areas where questions on procedures had not been resolved to complete satisfaction.

The test equipment was modified by utilizing the second trace on the scope to provide a precise reference point of impact of the test vehicle with the soil surface. This was accomplished by replacing one of the

guide wires on the drop tower with a high tensile strength, high resistance, nickel alloy wire. The wire was charged with a D.C. voltage of approximately 0.5 V/inch. A new slide wire guide was manufactured out of plastic with cap of high impact nylon for the wire to pass through. A contact wire was fitted to the slide and electrical connections provided. This provided a means of indicating a change in voltage as the model traveled along the wire. This voltage change could be translated into displacement by calibrating the travel of the model in relation to the scope settings. By superimposing both traces on the scope at the ground zero or zero time reference line and causing the traces to begin when the model was approximately 2 in. above the soil surface, two intersecting curves were obtained. The intersection is the precise point of impact. The penetration trace also served to provide a permanent record of depth of penetration.

Test drops have commenced under field conditions. The drop area had previously been prepared and the surface covered with plastic to preclude undue change in the soil moisture content.

Certain difficulties have arisen with the equipment under field conditions which have been or are being corrected. The primary difficulty has been the pick up of high frequency waves showing up on the scope as noise. This has required shielding of the circuits and complete shielding of the drop tower in order to obtain the sharp traces desired.

Lattice Analogy for an Elastic Material (Michael W. O'Neill)

No report available at this time.